

# Using Emission Inventories for Air Quality Modeling

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# Emission Inventories

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The inventory is a  
fundamental building block in  
developing an air quality control  
and maintenance strategy

# Typical Uses of Emission Inventories

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- **Identify sources and general emission levels**
- **Input for air quality modeling**
- **Useful for looking at trends over time**
- **Required to demonstrate goals are being met**
- **Trading programs**

## **Preparing an Inventory for Air Quality Modeling: “Emission Processing”**

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- **Typically, air quality models need detailed emission data inputs**
- **Inventory preparers work with modelers to understand what they need and ensure they know the limitations of the inventory**
- **Inventory preparers & AQ modelers use emissions processing tools to prepare the inventory for use in air quality models**

# **Commonly Used Emission Models/Processors**

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**For criteria pollutants**

**EMS95/2000, 2001**

**SMOKE**

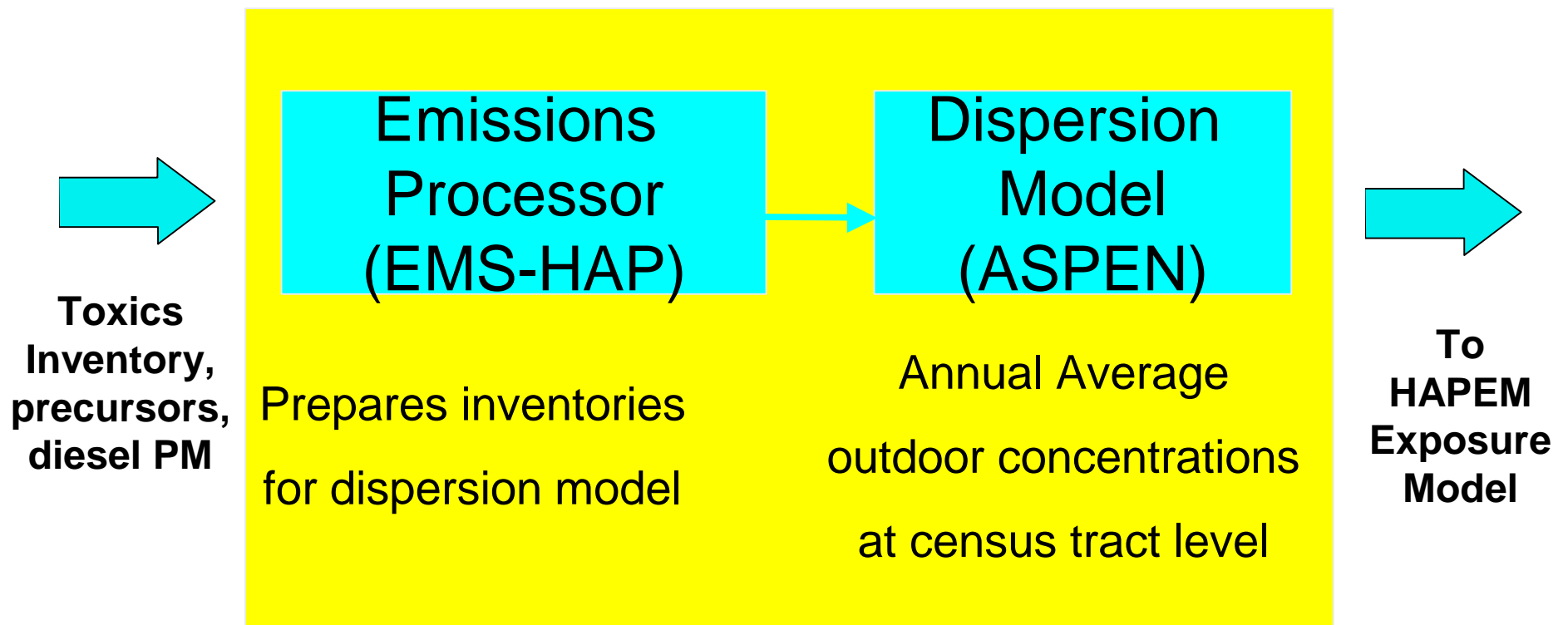
**EPS2.5**

**For toxic pollutants**

**EMS-HAP**

**SMOKE (upcoming)**

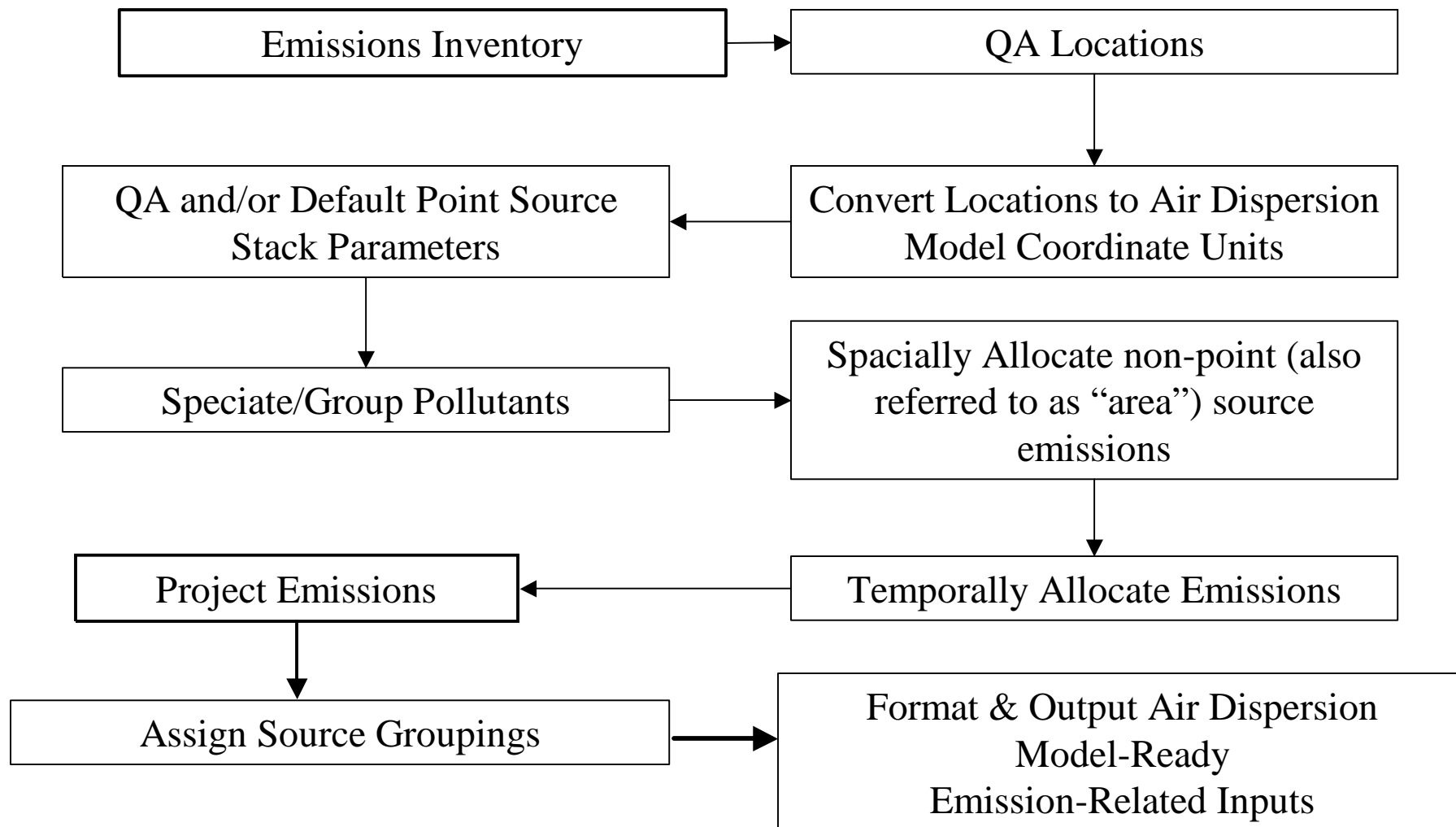
# EMS-HAP is Part of our Ambient Air Quality Modeling Tools for Toxics



User's Guides can be downloaded from [www.epa.gov/ttn/scram](http://www.epa.gov/ttn/scram)  
(See Dispersion Models/Alternative Models/ASPEN)

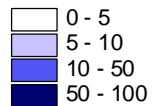
# *Functions of EMS-HAP*

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**For national-scale modeling, EMS-HAP assigns source locations and stack parameters if needed**

### Percent of Sites Defaulted





# Grouping Metal Compounds for Toxics Modeling

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Using HAP table in EMS-HAP:

## Partial Listing of Cadmium, Coarse and Cadmium Fine Groups

Name of Species	Description of HAP	Specie Code	React-ivity	Keep	HAP Code	Factor
CADMIUM CHLORIDE	Cadmium Compounds, coarse	10108642	3	Y	80324	0.1471
CADMIUM SULFATE	Cadmium Compounds, coarse	10124364	3	Y	80324	0.1294
CADMIUM NITRATE	Cadmium Compounds, coarse	10325947	3	Y	80324	0.1141
Cadmium & Compounds	Cadmium Compounds, coarse	125	3	Y	80324	0.2400
<b>Cadmium Oxide</b>	<b>Cadmium Compounds, coarse</b>	<b>1306190</b>	<b>3</b>	<b>Y</b>	<b>80324</b>	<b>0.2101</b>
CADMIUM SULFIDE	Cadmium Compounds, coarse	1306236	3	Y	80324	0.1867
Cadmium	Cadmium Compounds, coarse	7440439	3	Y	80324	0.2400
CADMIUM IODIDE	Cadmium Compounds, coarse	7790809	3	Y	80324	0.0737
CADMIUM CHLORIDE	Cadmium Compounds, fine	10108642	2	Y	80124	0.4660
CADMIUM SULFATE	Cadmium Compounds, fine	10124364	2	Y	80124	0.4098
CADMIUM NITRATE	Cadmium Compounds, fine	10325947	2	Y	80124	0.3613
Cadmium & Compounds	Cadmium Compounds, fine	125	2	Y	80124	0.7600
<b>Cadmium Oxide</b>	<b>Cadmium Compounds, fine</b>	<b>1306190</b>	<b>2</b>	<b>Y</b>	<b>80124</b>	<b>0.6652</b>

# **Speciating Chromium Compounds for Toxics Modeling**

**Needed when specific compound is not reported**

EMS-HAP will apply category-specific speciation data:

## **Potential Approach for Speciating of Chromium Compound Emissions into Hexavalent Chromium**

<b>Name of Species</b>	<b>Pollcode</b>	<b>OldS1</b>	<b>NewS1</b>	<b>OldS2</b>	<b>NewS2</b>	<b>OldS3</b>	<b>NewS3</b>	<b>FAC</b>	<b>MACT</b>	<b>SCC</b>	<b>SIC</b>
Chromium &Compounds VI	136	80141	69992	80341	69993			.9	1607		
Chromium&Compounds Other	136	80141	59992	80341	59993			.1	1607		
Chromium &Compounds VI	136	80141	69992	80341	69993			.2			9999
Chromium&Compounds Other	136	80141	59992	80341	59993			.2			9999
<b>Chromium&amp;CompoundsVI</b>	<b>136</b>	<b>80141</b>	<b>69992</b>	<b>80341</b>	<b>69993</b>			<b>.9</b>		<b>99999999</b>	
<b>Chromium&amp;CompoundsVI</b>	<b>136</b>	<b>80141</b>	<b>59992</b>	<b>80341</b>	<b>59993</b>			<b>.1</b>		<b>99999999</b>	

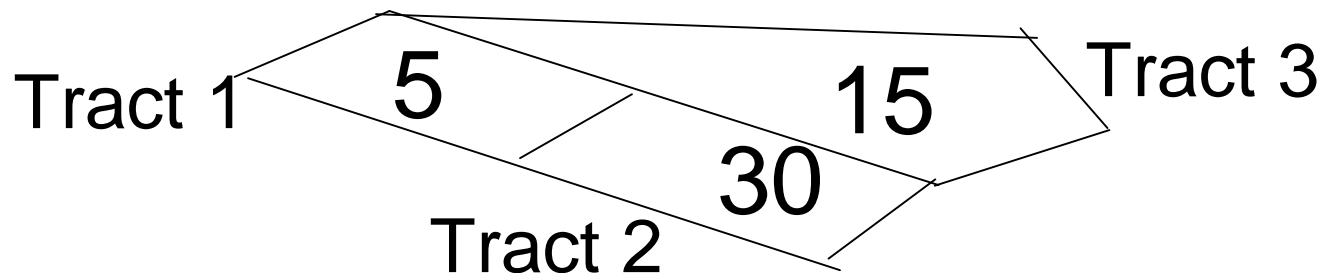
**Speciation data is now needed for the various source categories**

# Spatial Allocation of Non-point Emissions

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Concept: Use surrogates to allocate county level emissions for “non point” source categories.

Example: Use population data to allocate consumer product emissions



Tract 1 gets 10% of consumer product emissions ( $5/50$ ) for that county based on the population (5) in that tract

# Temporal Allocation of Emissions

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**Typically from annual (inventory) to  
what model needs**

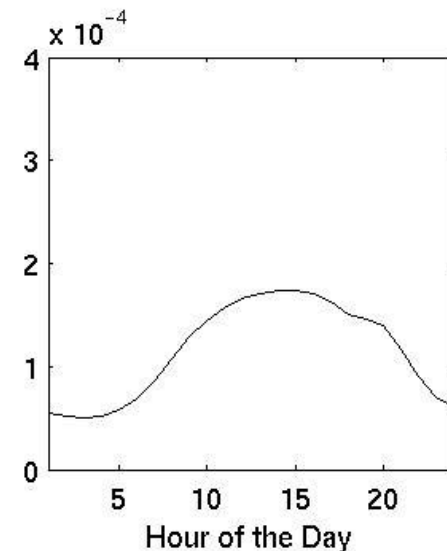
**ASPEN      —————→ Hourly (every day is treated the same)**

**ISCST3      —————→ Hourly for each day**

**Day-of-week and seasonal variations**

**Use temporal profiles or  
operating data**

Example temporal profile for aircraft  
emissions, for summer weekday



# Other Functions of Emissions Processors

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## **Assignment of source groups to emissions**

Allows you to apportion the ambient concentrations to individual source groups (e.g., major, area & other, onroad, nonroad)

## **emission projections**

Apply growth and future emission reduction scenarios

## **Producing model-ready input files**

# Conclusions

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- **Inventories needed to managing an air program**
- **Inventories need to be detailed to support modeling**
- **Steps to prepare inventories are done automatically by emission processors**
- **EMS-HAP designed for ASPEN and ISCST3 (ISCST3 functionality to be released next month)**